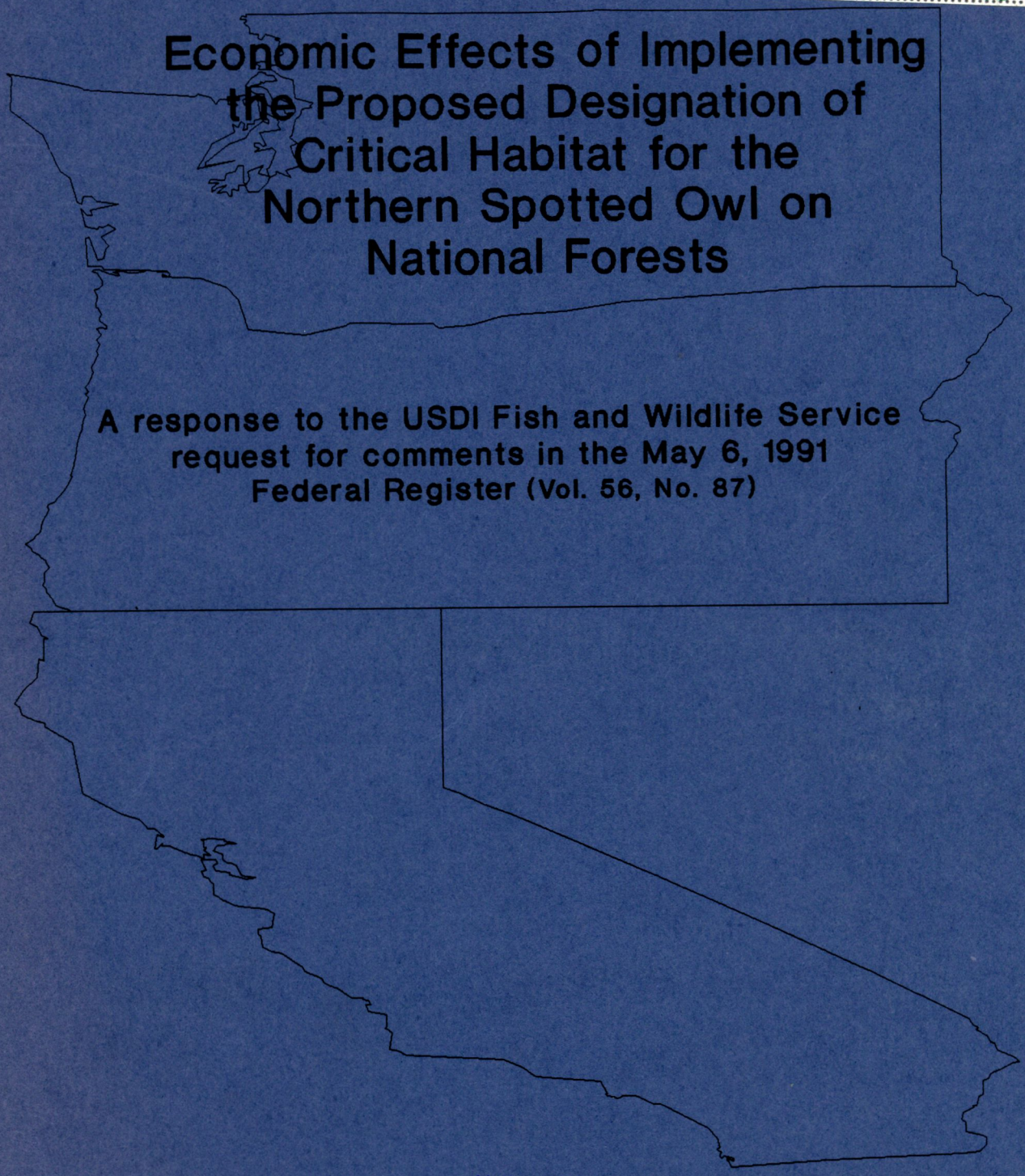
Economic Effects of Implementing the Proposed Designation of Critical Habitat for the Northern Spotted Owl on National Forests



A response to the USDI Fish and Wildlife Service request for comments in the May 6, 1991 Federal Register (Vol. 56, No. 87)

USDA Forest Service

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EXECUTIVE SUMMARY

On May 6, 1991, the Department of Interior, Fish and Wildlife Service published in the Federal Register a proposed designation of critical habitat for the northern spotted owl and solicited comments on any foreseeable economic and other impacts. This analysis reports USDA Forest Service comments on timber-related economic impacts of the proposed designation of critical habitat. Information on nontimber activities and projects is also presented.

Economic Impact

The analysis of economic impacts in Washington, Oregon, and California compares base volumes for National Forests with volumes remaining after implementation of the spotted owl conservation strategy and designation of proposed critical habitat. "Base volumes" for the Forest Service are final Forest Plans or draft Forest Plans where plans had not been finalized as of mid-1990.

The analysis considers the entire timber market economy. The effects of a timber supply reduction on Forest Service lands in Washington, Oregon, and California were analyzed nationally in terms of changes in price, consumption, trade, and interregional shifts in supply.

The analysis shows expected changes in employment as a result of National Forest timber supply reductions. Changes in prices will also affect revenues to the Federal Treasury and payments to States in the three affected States. The analysis shows that rising prices will substantially offset reductions in timber volume.

In summary, the analysis shows:

- Anticipated allowable sale quantity on affected Forest Service lands will decline by 2.4 billion board feet if harvest were to be excluded in all proposed critical habitat and 2.3 billion board feet if some harvest were to be allowed in critical habitat. (Tables I and II)

- Under base volume levels of allowable sale quantity on affected Forests, Forest Service harvest levels would support 40,770 jobs in total; about half of these are direct employment in the forest industry. The loss of jobs by 1995 in response to the Forest Service harvest volume reduction would be 24,960 to 25,964, depending on whether or not harvest is allowed in the proposed designated critical habitat on Forest Service lands. (Table III)

- Forest Service employment could decline by 2,000-3,000 positions in the three States.

- Elimination of planned nontimber-based activities could affect about 2,500 jobs by the end of the decade.

- Rising prices will help offset loss in revenues to the Treasury, but by 1995, implementation of the proposed critical habitat designation with total exclusion of harvest would mean a decline of $521 million and by 2000, a decline of $444 million as compared with revenues from "base volume" level of harvest. Harvest in the proposed critical habitat would offset the revenue decline by less than $35 million. (Table IV)

- Payments to States will decline despite rising prices. In total, the decline would be about $126 million by 1995 and $110 million by 2000 if harvest is excluded from the proposed critical habitat. If harvest is permitted, the decline would be offset by about $8 million in 1995 and $5 million in 2000. (Table V)

Table I. National Forest Anticipated Allowable Sale Quantity (ASQ) Under two Assumptions About Timber Availability in Critical Habitat Areas.

National Forests Affected by the Critical Habitat Determination	Base Volume[1/]	Actual or Projected Final Plans	Actual or Projected Final Plans Plus ISC Strategy	Actual or Projected Final Plans and ISC Strategy plus Implementation of the Proposed Critical Habitat Determination: Estimated Sale Capability both Within and Outside Critical Habitat	Actual or Projected Final Plans and ISC Strategy plus Implementation of the Proposed Critical Habitat Determination: Total Exclusion of Harvest from Critical Habitat
	Million Board Feet				
Washington National Forests	943	752	368	311	294
Oregon National Forests	2,196	1,844	1,160	949	884
California National Forests	694	600	282	261	226
Total National Forests	3,833	3,196	1,810	1,521	1,404

1/ Allowable Sale Quantity (ASQ) in Forest Plans as of May, 1990; includes final Forest Plans or draft Forest Plans where plans had not been finalized.

Table II. Changes in National Forest Anticipated Allowable Sale Quantity Under two Assumptions About Timber Availability in Critical Habitat Areas.[1/]

National Forests Affected by Critical Habitat Determination	Base Volume[2/]	Actual or Projected Final Plans	Actual or Projected Final Plans Plus ISC Strategy	Actual or Projected Final Plans and ISC Strategy plus Implementation of the Proposed Critical Habitat Determination: Estimated Sale Capability both Within and Outside Critical Habitat	Actual or Projected Final Plans and ISC Strategy plus Implementation of the Proposed Critical Habitat Determination: Total Exclusion of Harvest from Critical Habitat
	Million Board Feet				
Washington National Forests	943	-191	-575	-632	-649
Oregon National Forests	2,196	-352	-1,036	-1,247	-1,312
California National Forests	694	-94	-412	-433	-468
Total National Forests	3,833	-637	-2,023	-2,312	-2,429

1/ Changes are cumulative as compared with the base volume.

2/ Allowable Sale Quantity (ASQ) in Forest Plans as of May, 1990; includes final Forest Plans or draft Forest Plans where plans had not been finalized.

Table III. Changes in Timber-based Employment Under two Assumptions About Timber Availability in Critical Habitat Areas.[1/]

National Forests Affected by the Critical Habitat Determination	Actual or Projected Final Plans	Actual or Projected Final Plans Plus ISC Strategy	Actual or Projected Final Plans and ISC Strategy plus Implementation of the Proposed Critical Habitat Determination: Estimated Sale Capability both Within and Outside Critical Habitat	Actual or Projected Final Plans and ISC Strategy plus Implementation of the Proposed Critical Habitat Determination: Total Exclusion of Harvest from Critical Habitat
	Number of Jobs			
Washington National Forests	-2,104	-6,429	-7,086	-7,275
Oregon National Forests	-3,252	-10,696	-12,933	-13,626
California National Forests	-938	-4,432	-4,671	-5,063
Total National Forests[2/]	-6,294	-21,557	-24,690	-25,964

1/ Changes are cumulative as compared with employment supported by Allowable Sale Quantity in existing draft or final plans as of May 1, 1990.

2/ In addition to these changes, elimination of planned nontimber-based activities could affect about 2.5 thousand jobs by the end of the decade. Also, employment in the Forest Service could decline by 2,000-3,000 positions in the three States.

Table IV. Timber-based Revenue Under two Assumptions About Timber Availability in Critical Habitat Areas.

National Forests Affected by the Critical Habitat Determination	Base Volume 1/		Actual or Projected Final Plans		Actual or Projected Final Plans Plus ISC Strategy		Actual or Projected Final Plans and ISC Strategy plus Implementation of the Proposed Critical Habitat Determination: Estimated Sale Capability both Within and Outside Critical Habitat		Actual or Projected Final Plans and ISC Strategy plus Implementation of the Proposed Critical Habitat Determination: Total Exclusion of Harvest from Critical Habitat	
	1995	2000	1995	2000	1995	2000	1995	2000	1995	2000
	Millions of 1990 Dollars									
Washington National Forests	204	188	180	155	100	89	81	75	76	74
Oregon National Forests	617	564	596	523	439	400	353	325	334	316
California National Forests	176	143	182	169	85	76	76	69	66	61
Total National Forests	997	895	958	847	624	565	510	469	476	451

1/ Allowable Sale Quantity (ASQ) in Forest Plans as of May, 1990; includes final Forest Plans or draft Forest Plans where plans had not been finalized.

Table V. Payments to States Under two Assumptions About Timber Availability in Critical Habitat Areas.

National Forests Affected by the Critical Habitat Determination	Base Volume 1/		Actual or Projected Final Plans		Actual or Projected Final Plans Plus ISC Strategy		Actual or Projected Final Plans and ISC Strategy plus Implementation of the Proposed Critical Habitat Determination: Estimated Sale Capability both Within and Outside Critical Habitat		Actual or Projected Final Plans and ISC Strategy plus Implementation of the Proposed Critical Habitat Determination: Total Exclusion of Harvest from Critical Habitat	
	1995	2000	1995	2000	1995	2000	1995	2000	1995	2000
	Thousands of 1990 Dollars									
Washington National Forests	46,193	42,365	40,790	35,195	22,569	20,047	18,165	16,929	17,287	16,607
Oregon National Forests	148,612	138,732	141,481	123,670	104,304	94,461	84,138	77,710	79,525	75,511
California National Forests	44,073	35,880	45,434	42,170	21,185	18,943	18,995	17,147	16,495	15,260
Total National Forests	238,878	216,977	227,705	201,035	148,058	133,451	121,299	111,786	113,307	107,378

1/ Allowable Sale Quantity (ASQ) in Forest Plans as of May, 1990; includes final Forest Plans or draft Forest Plans where plans had not been finalized.

INTRODUCTION

On May 6, 1991, the Department of Interior, Fish and Wildlife Service (F&WS) published in the Federal Register (Vol. 56, No. 87) a proposed designation of critical habitat for the northern spotted owl. The F&WS solicited public comments from other government agencies concerning the proposed rule. Comments that were particularly sought included the following:

- Any foreseeable economic and other impacts resulting from the proposed designation of critical habitat.

The purpose of this report is to provide to the F&WS comments on the possible economic effects that designation of critical habitat may have as a result of changes in the volume of timber sold from affected National Forests. The report provides information on employment, timber revenues, and payments to States from these revenues. Available information on nontimber effects is also presented.

Background

On April 3, 1990, an Interagency Scientific Committee (ISC) released a report entitled "A Conservation Strategy for the Northern Spotted Owl." In response to this report, the Secretaries of Agriculture and Interior, through the Chief of the Forest Service and the Director of the Bureau of Land Management formed an interagency working group to analyze the economic impacts of implementing the recommendations of the ISC. The findings of the interagency working group were presented in a report entitled "Economic Effects of Implementing a Conservation Strategy for the Northern Spotted Owl."

These comments to the F&WS build on the existing analysis of the economic impacts of implementing the recommendations of the ISC Strategy. The comments:

- Provide a review of volumes that may be affected on Forest Service lands from implementation of final forest plans.
- Provide revised estimates of harvests and associated economic impacts of implementing the ISC recommendations on Forest Service lands. The report follows the format used in the economic analysis of the ISC strategy. This should facilitate comparison of the two reports.
- Provide estimates of harvests and associated economic impacts if no harvesting is allowed in the proposed critical habitat areas (CHAs) on Forest Service lands, and
- Provide estimates of harvests and associated economic impacts if harvesting is allowed in the proposed critical habitat areas on Forest Service lands.

To estimate and describe possible effects, it was necessary to make assumptions and specify scenarios. Numbers in the report generally were not rounded off, but were left as developed from the analysis. This specificity should not be interpreted as an indication of high precision; rather the numbers should be used as an estimate of the direction and magnitude of changes.

These comments were prepared by the Forest Service, USDA. The following team provided leadership in completing the report:

Economic Effects Team

Tom Hamilton, Team Leader
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ECONOMIC ANALYSIS

Timber Harvest Volume

This section of the report compares the timber situation during the decade of the 80's in Washington, Oregon, and California with the situation if the critical habitat proposed by the Fish and Wildlife Service is designated. The report concentrates on dollar and employment impacts in the affected areas of these three States. However, it also examines the effect nationally of a reduction in Forest Service timber harvest in Washington, Oregon, and California.

Forest Service

The data for anticipated allowable sale quantity are the latest available from the Forest Service. The starting point for the analysis is the base volume (allowable sale quantity (ASQ) in Forest plans as of 1990). This is a combination of final Forest Plans, or draft Forest Plans for forests where plans had not been finalized as of mid-1990. This starting point level is lower than harvest levels in the later years of the 1980's. For example, for Forest Service Region 6 (Washington and Oregon), the starting point level is about 4 billion board feet; during the late 1980's, National Forest harvest exceeded 5 billion in these two States. The starting point was selected for two reasons. First, it represented planned outputs from these Forest Service lands before the ISC strategy and critical habitat were proposed and were a part of the planning process. Second, it approximates historic levels of harvest. Figure 1 shows the harvest for Forest Service lands for the period, 1980-1989. During this period, there was a substantial amount of fluctuation in timber harvest from 2.3 to 5.5 billion board feet per year on National Forests. However, the average harvest was 4.1 billion board feet per year--about the same as the starting point level in the analysis.

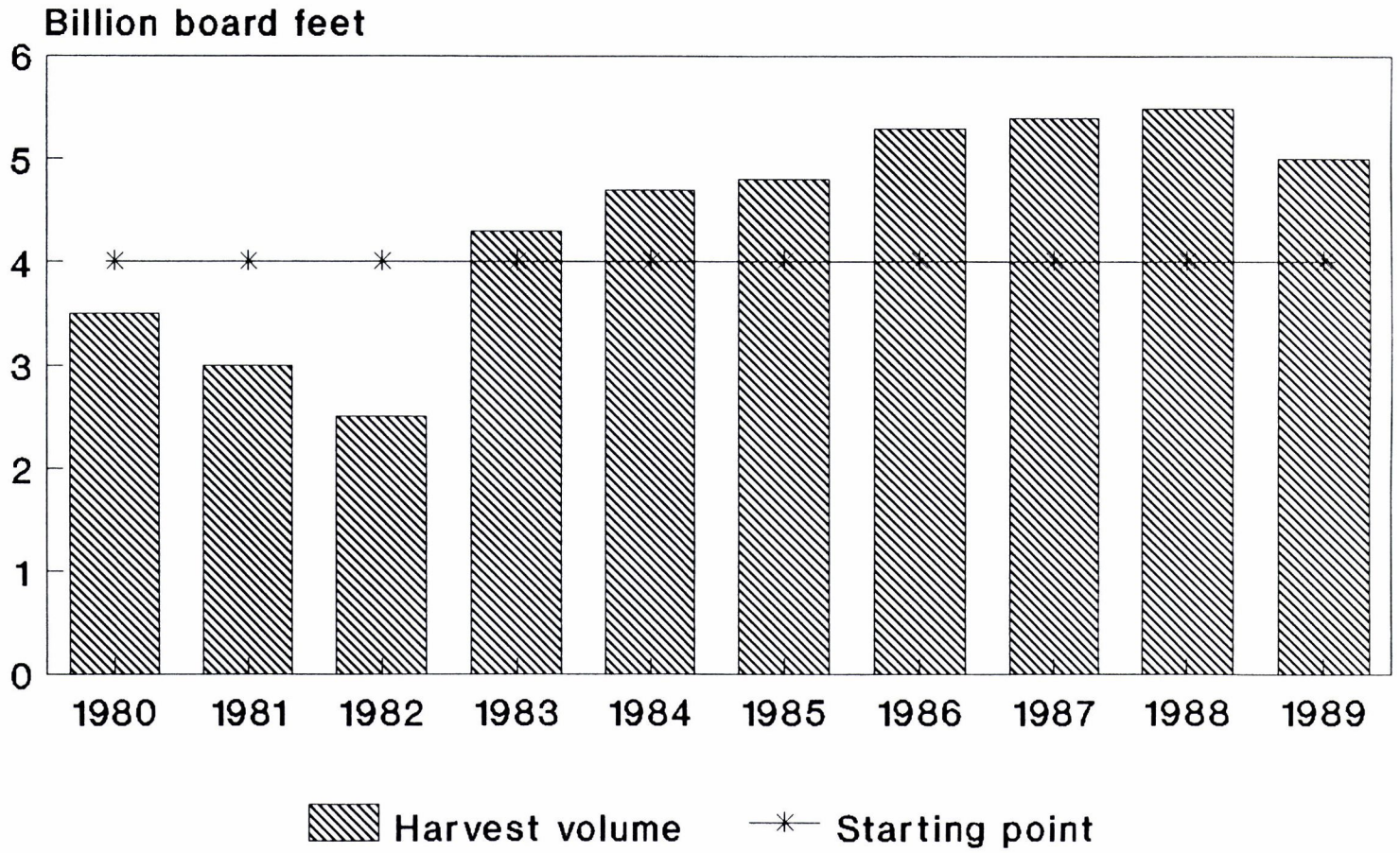
The analysis shown here is based on the change from this starting point volume if the critical habitat proposed by the Fish and Wildlife Service were fully designated on National Forests. Two interim steps are also shown. The first interim step shows a timber volume for projected final plans for those affected forests where plans were still in draft stage. These projected volumes could change up to plus or minus 10 percent in actual final plans. The mid-point of this range is used in this report in order to assess the impact of implementing the ISC strategy. The second interim step shows a timber volume if the conservation strategy recommended by the ISC were to be fully implemented.

Other public agencies

About 1 billion board feet of timber are harvested on State lands in the three States each year. No analyses of timber volume reduction for these lands were made in this study.

Bureau of Land Management lands had an average harvest level of about 900 million board feet during the decade of the 1980's. For the purposes of this report, the Bureau of Land Management is assumed to sell the annual volumes in

Figure 1 Volume of timber harvested from USDA Forest Service PNW Region and Starting Volume for Analysis



the Jamison Strategy--750 million board feet per year. This is considered to be an estimate of the maximum timber sales volume from BLM lands.

No allowance has been made for the effects of designation of critical habitat on the Bureau of Indian Affairs' timber sales program which averaged over 300 million board feet during the 1980's. Nor have allowances been made for relatively small federal holdings of the Department of Defense and other public agencies.

Private lands

For this report, timber harvest from private lands is assumed to be unaffected by critical habitat designation and to be responsive to market signals as it has in the past.

However, a survey of private landowners in Washington, Oregon, and California was commissioned by the American Forest Resource Alliance to determine how these landowners viewed the effect of the proposed designated critical habitat on harvest from these lands.

The tabulation below shows that, based on this survey, harvest on private lands would be substantially lower if restricted by the proposed designation of critical habitat.

Volume of Timber Harvest on Private Lands for Base Volume and Results of a Survey of Private Landowners.

	Base volume 1/	Private landowner survey results 2/
	Million board feet	
Washington and Oregon	7,865	4,982
California	2,115	601
Total	9,980	5,583

1/ Average harvest for the period 1980-89.
2/ Projected average annual harvest for 1991-96 assuming no harvest on Critical Habitat Areas.

Affected volume

Table 1 shows the changes in ASQ volume for forests affected by designation of proposed critical habitat. The reduction in ASQ from implementing final forest plans is estimated at 0.6 billion board feet, a decrease of 17 percent from the base volume. The reduction on Forest Service lands after implementation of the ISC recommendations would be 2.0 billion board feet, a decrease of 53 percent from the base volume. If harvest is not allowed in the proposed critical habitat, the reduction on Forest Service lands would be 2.4 billion board feet as compared with the base projection, down 63 percent. If some harvest is allowed in the proposed critical habitat, the reduction is estimated to be

Table 1. National Forest Anticipated Allowable Sale Quantity Under two Assumptions About Timber Availability in Critical Habitat Areas.

National Forests Affected by the Critical Habitat Determination	Base Volume 1/	Actual or Projected Final Plans	Actual or Projected Final Plans Plus ISC Strategy	Actual or Projected Final Plans and ISC Strategy plus Implementation of the Proposed Critical Habitat Determination: Estimated Sale Capability both Within and Outside Critical Habitat	Actual or Projected Final Plans and ISC Strategy plus Implementation of the Proposed Critical Habitat Determination: Total Exclusion of Harvest from Critical Habitat
	Million Board Feet				
Washington National Forests					
Gifford Pinchot	388	334	166	127	118
Mt. Baker-Snoqualmie	170	108	32	27	27
Okanogan	63	63	52	48	48
Olympic	186	111	45	38	31
Wenatchee	136	136	73	71	70
Subtotal	943	752	368	311	294
Oregon National Forests					
Deschutes	202	100	78	75	73
Mt. Hood	255	189	124	100	91
Rogue River	137	120	75	57	57
Siskiyou	160	160	105	86	82
Siuslaw	335	335	170	160	158
Umpqua	340	334	240	176	166
Willamette	568	491	271	202	165
Winema	199	115	97	93	92
Subtotal	2,196	1,844	1,160	949	884
California National Forests					
Klamath	200	142	96	92	81
Mendocino	93	84	27	26	25
Shasta-Trinity	226	224	82	78	70
Six Rivers	175	150	77	65	50
Subtotal	694	600	~~608~~ 282	261	226
Total Forest Service	3,833	3,196	1,810	1,521	1,404

1/ Allowable Sale Quantity (ASQ) in Forest Plans as of May, 1990; includes final Forest Plans or draft Forest Plans where plans had not been finalized.

somewhat less--2.3 billion board feet, a decline of 60 percent from the base level. The ASQ reduction by State for Forest Service lands affected by the critical habitat designation would be 67-69 percent in Washington, 57-60 percent in Oregon, and 62-67 percent in California.

MARKET IMPACTS OF ALTERNATIVE FOREST SERVICE TIMBER FLOWS

This section highlights the various economic effects of alternative Forest Service and private timber flows. Regional and national effects on product and timber markets are reported.

Impacts of alternative flows of Forest Service timber are estimated as changes from a base-line projection of future timber markets, given the general assumptions in the 1989 RPA Timber Assessment. These assumptions were modified to account for the current recession in the housing market and new information on log export markets as discussed later. The model used for the projections is the Timber Assessment Market Model--TAMM (Adams and Haynes 1980 and Haynes and Adams 1985). It provides an integrated structure for considering the behavior of prices, consumption, and production in both stumpage and product markets.

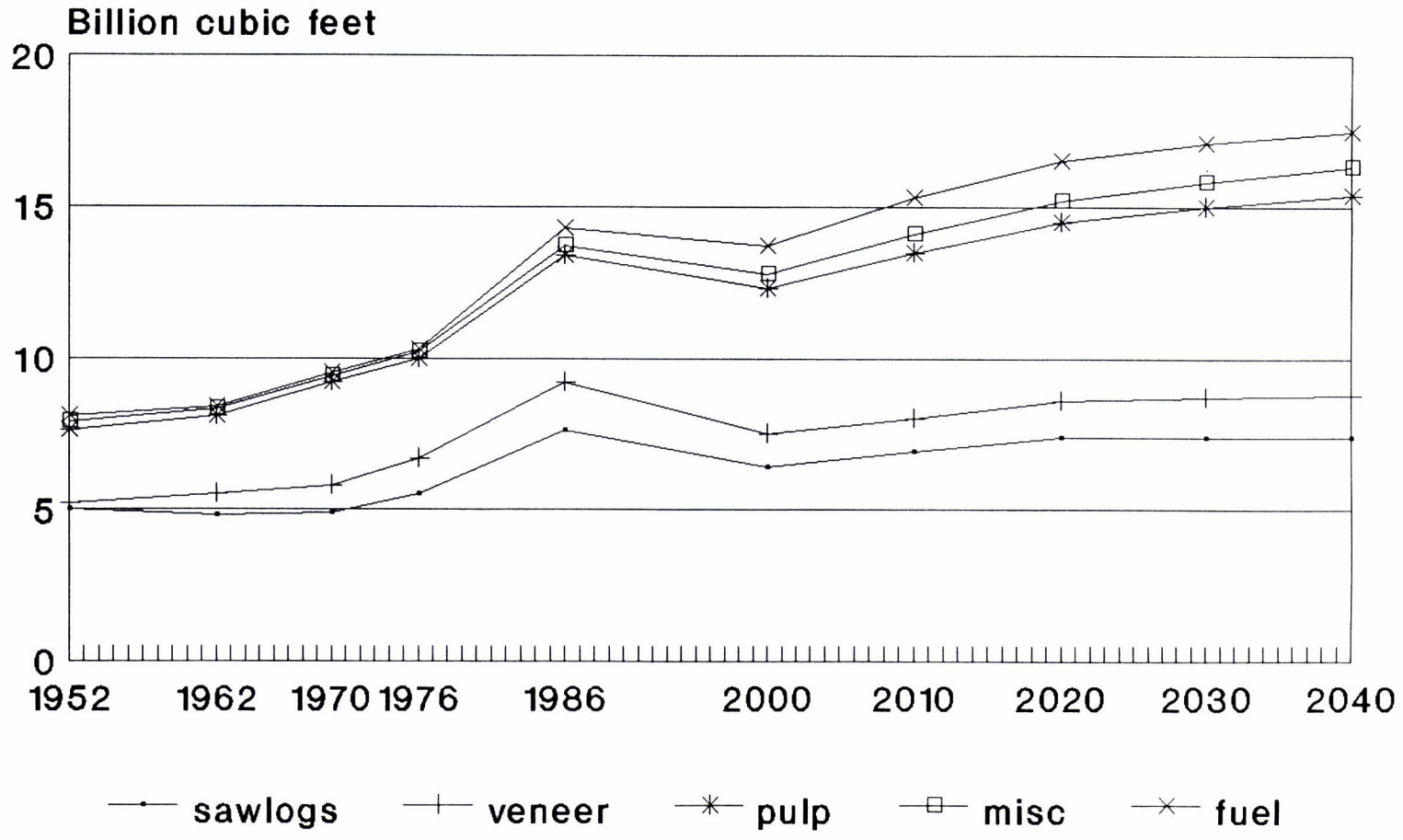
Projections from TAMM reflect the consequences of balancing the supply of timber and the demand for the final products made from that timber. The projections recognize that production and consumption are sensitive to both product prices and production costs. They also recognize that different types of landowners have different propensities for harvesting and managing their timberlands. Private harvests are treated as price and inventory responsive while public harvests are treated as fixed at predetermined levels. TAMM also includes an inventory projection system for private timberlands.

In the past decade, TAMM has been used widely within the USDA Forest Service and by interest groups to estimate the market impacts of various policies and issues. The present version serves best as an indicator of long-term trends. For example, in the 1989 RPA Timber Assessment, it was used to make projections to the year 2040. TAMM is used in this analysis to examine market impacts for the 1990's. In comparing alternative ASQ levels for Federal timber, emphasis is on differences from the base-line projection rather than the projections themselves.

Our analysis begins with a summary of historical trends and the findings in the base-line projection. Then, assumptions are changed and market impacts are estimated as differences from the base-line projection.

U.S. Roundwood Consumption Increasing: Total U.S. consumption (figure 2) of softwood roundwood from growing stock was 14.3 billion cubic feet in 1986. This was roughly 75 percent above the average consumption in the early 1950's. It is expected to remain about at this level through 2000 and then to increase to 17.5 billion cubic feet by 2040, with the largest increase in pulpwood. In the near term, rising prices help slow the growth in consumption, but in the longer term a slowing of domestic markets (especially for residential construction) and increasing use of hardwoods accounts for slower projected growth in demand for softwood timber. The United States will remain a net importer of softwood forest products. This is especially the case for softwood lumber imports from Canada.

Figure 2 U.S. softwood roundwood consumption by product, 1952-2040



Cumulative

Figure 3 shows long-term trends in softwood harvest by major U.S. region. After World War II, strong demand for forest products and declining private harvests brought expanded markets for public timber. On Federal timberlands, management policies shifted from the custodial posture of the inter-war years toward an active program of timber sales. National Forest harvest more than doubled in the 15 years after 1950. By the late 1960's, the harvest was approaching the maximum levels under existing management plans, and the Forest Service adopted a nondeclining even-flow approach to the computation of allowable cuts. Harvest has gradually declined over the past 20 years.

U.S. Product Demand: Only limited growth in demand for solid-wood products will take place in the future. As the population ages, new housing construction is stable to declining. Consumption increments come almost entirely from increased wood use in residential upkeep and alteration, nonresidential construction, and manufacturing. U.S. lumber consumption rises to 56 billion board feet by 2040 (the 1987 peak was 50.6 billion feet). Plywood consumption returns to 23 billion square feet by 2040 (the current level is 21 billion feet) after a period of modest substitution-induced decline over the next 20 years. In the fiber products sector, growth in consumption slows in line with GNP and also because of assumed increases in the use of recycled fibers. For western Washington and western Oregon, pulp output is projected to grow by roughly 20 percent over the 50-year projection period.

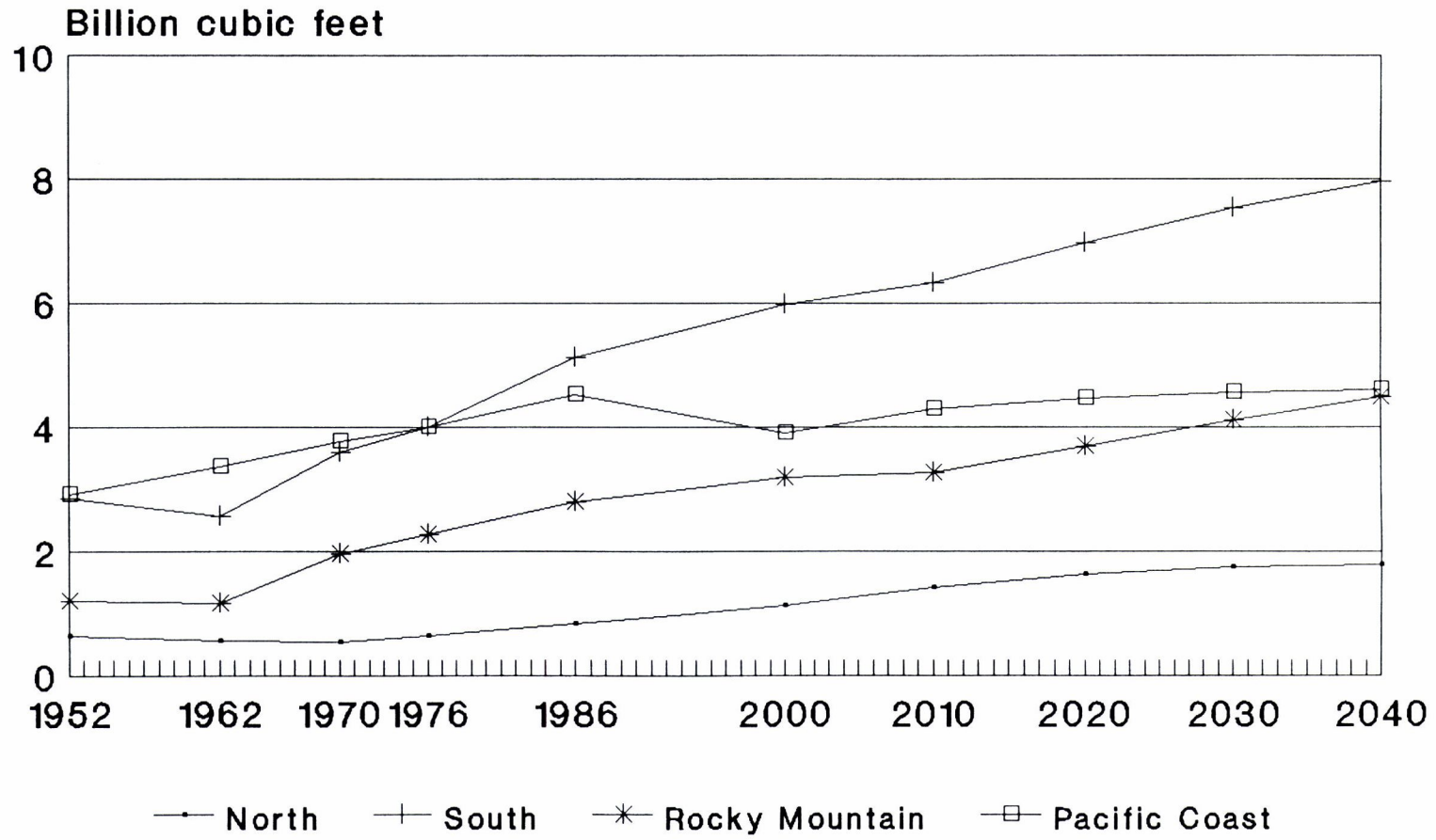
Costs and Technology: Real non-wood costs (output basis) for solid-wood mills fall by less than 0.5 percent per year as labor productivity continues to improve and use of other materials and energy falls. Recovery (product output per cubic foot of log input) rises at roughly 0.1 percent year over the 50-year projection. This is a far slower rate than observed in the 1980's due to rapidly declining future log size and quality.

International Markets and Log Exports: After 1984, the value of the U.S. dollar dropped sharply against the Japanese yen. This plus a good housing market in Japan stimulated Japanese imports of softwood logs and lumber from the Pacific Northwest. In addition, China entered the market for U.S. logs in the early 1980's with the Pacific Northwest being the source of much of the supply. Thus, Washington and Oregon had additional sources of demands for logs not shared by other U.S. regions. As a result, softwood lumber and plywood manufacturers in the Pacific Nothwest have to compete against log exporters for raw material supplies to a much larger extent than manufacturers in other regions of the country.

Canadian softwood lumber producers will experience gradually rising delivered wood costs as haul distances increase and stand densities fall. The real Canadian-U.S. exchange rate is expected to change little from the current level. In the base case, exports of lumber and plywood grow little over the projection period. Log exports fall from the 1984-1988 average level of 3.1 billion board feet per year (1988 peak level of 3.6 billion feet) to an average of 2.5 billion board feet by 2000. Limitations in product and declining log export volumes derive from the assumption of increased competition from Canada, the Southern Hemisphere, and the Soviet Union.

Growth in Softwood Harvest is in the South: In figure 3, there are two trends to note. First, the three West Coast States together and the South are expected to remain the two most important timber producing regions in the

Figure 3 U.S. softwood timber harvest by region



United States. Second, the South overtook the Pacific Coast in the mid 1970s. Equally important is the share of Federal harvest which in 1986 constituted 21 percent of total harvests. By 2000, this fraction is expected to drop to 19.4 percent. Thereafter, this fraction continues to decline, reaching 16.4 percent by 2040.

Total Pacific Coast Harvest Projected to Level Off After Decline in 2000: For the Pacific Coast, harvests in recent years have been at all time highs. Figure 4 shows softwood harvest by owner. The smallest ownership class (in terms of harvest) is the nonindustrial private timberland. Harvest on this ownership had been declining frome the early 1950s until 1986. After that, harvest in western Washington and western Oregon started to increase. The share of Forest Service timber has changed over the past several decades from 17 percent in 1952 to 32 percent in 1986.

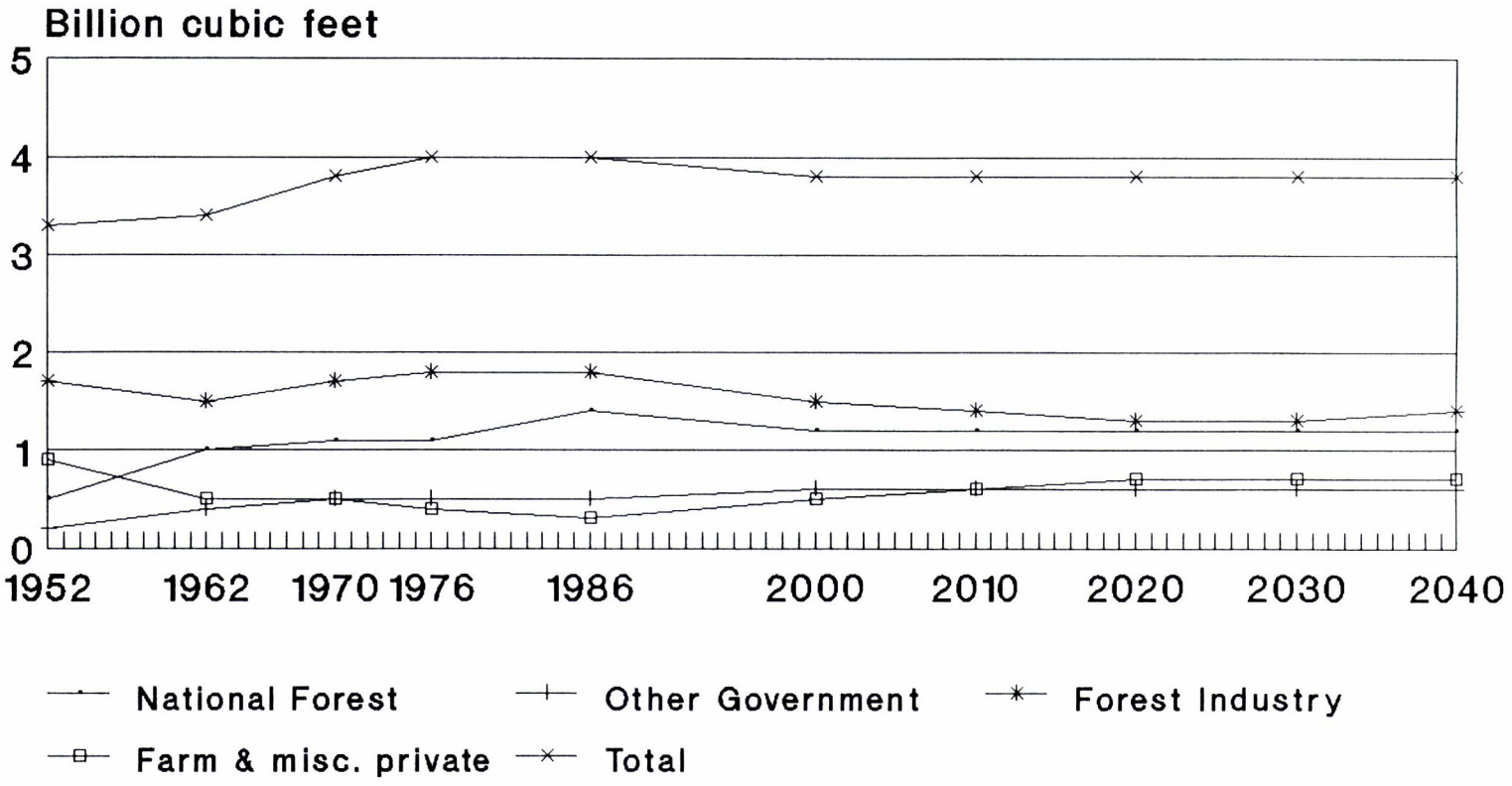
Industries Differ Between Washington/Oregon and California: The industry differs between the two areas primarily in the absolute size of the lumber industry and in the concentration of the softwood plywood industry in western Washington and western Oregon. The Douglas-fir subregion also contains roughly 8 million tons of pulp and paper production. There is only a small pulp and paper industry in California that focuses on conversion. Solid-wood products are expected to continue their dominance of the forest products industry in the Pacific Coast region. The exception is the plywood industry where production in the Douglas-fir subregion is expected to drop as a consequence of competition from oriented strand boards and in California where production has declined because of competitive pressures from other plywood producing areas.

Pacific Coast Must Compete With South and Canada: Output of the solid-wood products industries (lumber and plywood) in the Pacific Coast regions has fluctuated with periodic construction cycles but has shown essentially no upward or downward trend since the mid-1960's (except for the clear drop in plywood production in California). Growth in U.S. consumption over the past two decades has been met by the South in the case of plywood and by the South and Canada in the case of softwood lumber.

The Pacific Coast's share of aggregate national and virtually all regional markets has fallen steadily. These trends are a reflection of the region's high production costs relative to its key North American competitors. As a result of increases in both delivered wood and nonwood costs, the region emerged as the high cost lumber and plywood producer in North America in the early 1970's. The recession of 1980-82 brought a sharp drop in delivered wood costs due both to declining stumpage prices and reduction in log and haul costs. This change helped to narrow the cost differential with the South but did little to overcome the strong wood cost advantage of interior British Columbia in the case of lumber. Reductions in work force and improvements in recovery efficiency also have acted to lower nonwood costs, but the region remains the high cost producer in both lumber and plywood.

Fiber Products Industries Expanding: The fiber products industry in western Washington and western Oregon has expanded steadily as paper and board facilities have been integrated with pulping operations. Recent increases have come in newsprint and unbleached kraft (linerboard and packaging) grades, with stable to declining output in fine and other papers. Production is from

Figure 4 Total removals of softwood timber from WA, OR, and CA, by ownership



otherwise unused residues from solidwood production, from wastepaper, and from roundwood, chipped in the woods or at other remote locations.

Log Exports Have Been an Important Market: Log exports have comprised the most significant growth sector especially in western Washington and western Oregon, consuming some 20 percent of total regional harvest by 1980. After peaking in the late 1970's, log exports from this region fell in the 1980-82 recession. They subsequently recovered to all time highs in 1988 and 1989. Despite the sharp drop in volumes in the early 1980's, export prices did not fall as rapidly as domestic prices and exports remained a key revenue source for some regional firms during the recession. In the recovery, the People's Republic of China (PRC) has emerged as the second largest importer. Logs exported to the PRC are roughly the same quality as those used in domestic mills.

Stumpage Prices Expected to Increase: As a consequence of this increasing pressure on domestic timber inventories, timber prices are expected to continue to increase in real terms.

There are differences in harvest and industry trends between California and Washington/Oregon. Total timber harvest (sawtimber and nonsawtimber) in Washington/Oregon reached all time high levels in recent years while those in California have been stable but below those seen in the early 1950s.

Special Issues not Included in Analysis: There are many current issues whose resolution could lead to changes in the base-line projection. The following issues were considered, but not included in the base-line analysis because their resolution is uncertain or their potential effects on timber supplies are uncertain:

- Roadless areas
- Below cost timber sale programs
- New perspectives
- Canadian supply situation
- Productivity of nonindustrial private forest lands
- Paper and board recycling

Roadless Areas

It has been suggested that timber harvesting be banned on existing roadless areas in National Forests. Implementation of the ISC Strategy and designation of proposed critical habitat will have this effect in the Pacific Northwest.

Below Cost Timber Programs

It has been suggested that all below cost timber programs be eliminated. The main effects of this action would be in the Rocky Mountain regions where the allowable sale quantity would decline. There is the possibility that implementation of the ISC report recommendations and designation of proposed critical habitat would raise stumpage prices enough to substantially eliminate below cost timber programs. The prices for many of the below cost timber programs are within $10 per thousand board feet of the cost.

New Perspectives

The silvicultural practices associated with the new perspectives in forestry concept will have as an effect an increase in logging costs. The extent of application of new perspectives on National Forests is yet to be determined. The increase in logging costs may be enough to result in emergence of additional below cost programs. These higher costs would be offset somewhat by higher stumpage prices associated with implementation of the ISC report recommendations and designation of proposed critical habitat, however.

Canadian Supply Situation

One response to implementation of the ISC report and designation of proposed critical habitat is to increase imports of softwood lumber from Canada. In the absence of a nationwide overview of timber demand and supply relationships in Canada, there has developed different opinions about long-term timber supply prospects in Canada. One view has it that Canada is near the ceiling on timber supply and that significant, sustained increases in production would be difficult. A second view is that there are significant volumes of softwood timber that are currently economically inaccessible. Sustained increases in roundwood prices such as from implementation of the ISC report would make these roundwood volumes economically accessible. In addition, Canada sells some 3 billion board feet of softwood lumber to offshore markets. Significant increases in prices in the United States would tend to draw lumber away from offshore markets. For the purposes of analysis of impacts of implementation of the ISC report and designation of proposed critical habitat, it was assumed that Canada will continue to be as responsive in the future as it has been in the past to increases in roundwood and softwood lumber prices in the United States.

Productivity of Nonindustrial Private Forest Lands

Private forest land can offset some, but not all, of the reduction in ASQ on National Forests. In the base-line projection, forest industry land is assumed to be managed intensively and some intensification of management is assumed to be the case for nonindustrial private forest lands as reflected by remeasurement of forest inventory plots. These assumptions lead to the establishment of 50 million acres of southern pine plantations by 2040 as compared with 20 million today. These additional plantations have major effects on the long-term supply/demand outlook, but not in the short term.

State and local control of harvesting and management activities on privately owned forest land may be becoming more common. The effects of these controls are under study, but no explicit consideration of them is given in the base line projection. Although they may lead to short-term decreases in supplies, in the long term, they may lead to long-term supply increases in response to increased management of private lands.

Paper and Board Recycling

The American Paper Institute (API) recently announced that the paper industry would increase the recovery of paper and board products from a current rate of 33 percent to a recovery rate of 40 percent by 1995. The API recycling goal has the effect of "freeing up" timber in the South and other regions that would

have otherwise been used in pulp and paper production. The API recycling goal was analyzed. Effects on the Pacific Northwest and Pacific Southwest are significant only after the year 2000. Revenue from timber sales in these regions would decline relative to the base scenario no more than two percent in the year 2000 as a result of the API recycling goal.

Harvest by Ownership for Washington and Oregon: The U.S. timber industries in the 1980's were affected by the strong business cycle that characterized the decade. The early years were characterized by slowing economic growth and high interest rates that caused a severe recession in the home building industry. However, beginning in 1983 and continuing through 1989, there was an unprecedented period of high wood consumption in the United States. These sustained high levels of consumption increased domestic harvest and imports of lumber from Canada.

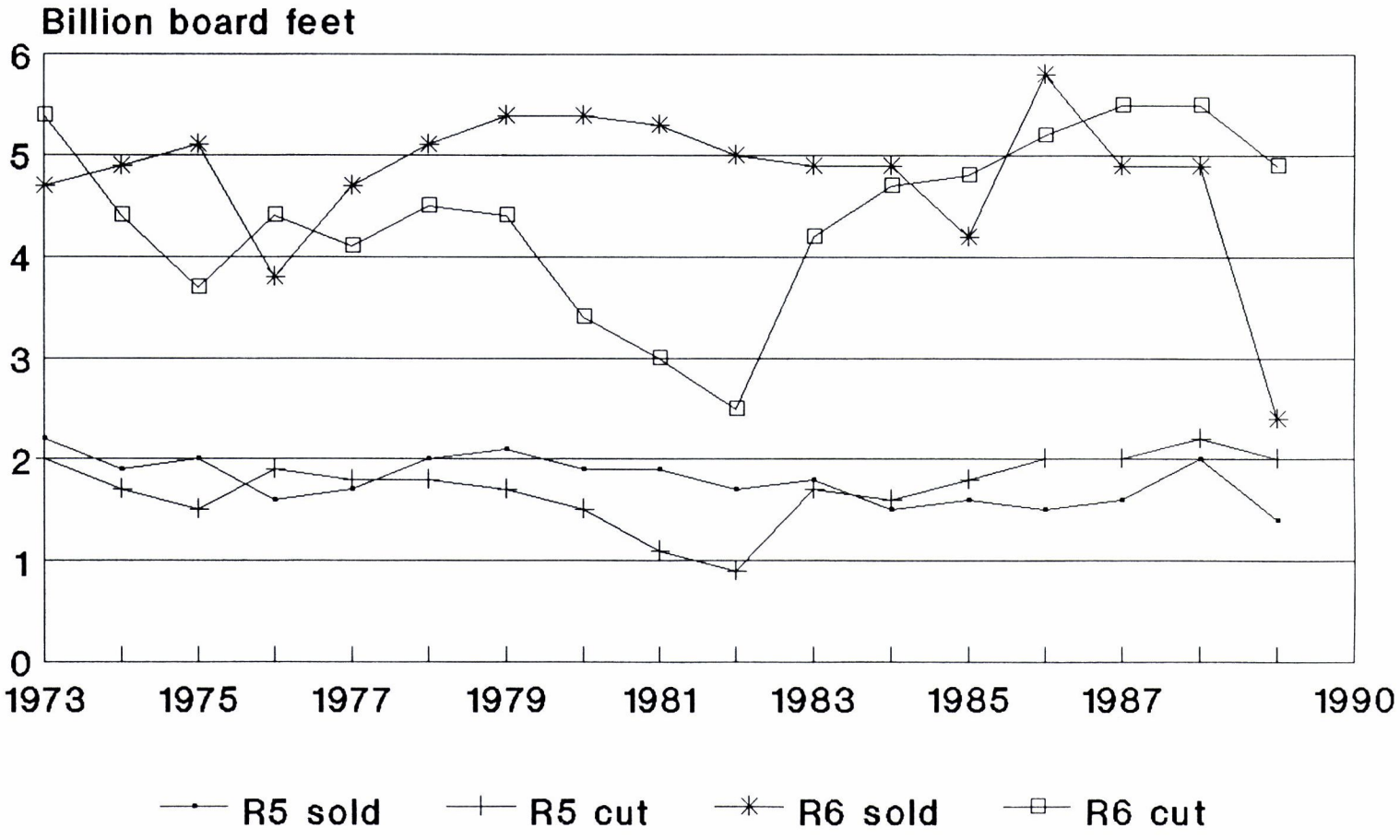
The recession also caused structural shifts in timber sale programs for the Forest Service, the Bureau of Land Management, and the State of Washington Department of Natural Resources. The late 1970's was a time of high inflation that was reflected in part in high bids for timber harvesting rights for these three agencies. In western Washington and western Oregon, there was no escalation clause in Federal contracts permitting changes in the bid price according to market conditions. Contracts stipulated that the purchaser pay the bid price. Contracts for State of Washington timber sales were similar to those used by Federal Agencies. When the recession came, markets did not support the high prices bid for timber in previous years. When the 3 to 5 year contracts started to become due, purchasers appealed for relief. Under the terms of relief legislation, purchasers could avoid having to fulfill original contracts if they met specified circumstances. In addition, timber sale contracts were changed in 1983-84 to try to avoid a repeat of the conditions that led to the buy-back of timber sale contracts.

The harvest of timber on private timberland has also been affected by structural change. By the end of the 1980's, much of the old-growth timber on forest industry land was harvested and an increasing proportion of the harvest is composed of second-growth timber from northwest Oregon and the Puget Sound region. This transition to second-growth timber was one of the driving forces behind the change to modern technology in mill processing.

Thus, timber harvest by owner in the Pacific Northwest in the 1980's was determined in part by the market and in part by the political process within an environment that was unique in the United States. The effects of these forces are reflected in the harvest patterns for these ownerships shown in Table 2. In general, markets have been good for timber products and it is within this context that alternative scenarios are presented for the future.

Forest Service sales programs in the last 15 years have averaged 1.8 and 4.9 billion board feet in the Pacifc Southwest and Northwest Regions. These sales programs have been relatively constant (figure 5) and uninfluenced by economic cycles during the period. Harvest levels, though, are much more variable. For example, harvest in the Pacific Northwest has ranged from from 2.5 to 5.5 billion board feet. Harvest levels have averaged 1.7 and 4.4 billion board feet in the Pacific Southwest and Pacific Northwest Regions, respectively, during this period. Different harvest than sales levels results from a number

Figure 5 Timber cut and sold in Forest Service Regions 5 and 6



of factors including the build up of uncut volume during 1980-1983, reporting inconsistencies between cut and sold, and timber appraisal practices.

Effects of Changes in Assumptions: The basic approach used in this economic analysis is one referenced to as scenario planning (Wack 1985). There are four scenarios in the analysis. All employ the same assumptions as for the base-line projection regarding trends in demand determinants for solidwood and fiber products, nonwood production costs, technology, nonindustrial harvest response, and trade with countries other than Canada. The four scenarios are compared with a base-line projection that assumes total Forest Service ASQ of 4.9 billion board feet for the Pacific Northwest Region and the northern California Forests of the Pacific Southwest Region.

The 4 scenarios are termed Plans, ISC, CHA1, CHA2.

Plans

This scenario uses the estimated harvest level associated with final or projected final forest plans. In this scenario, ASQ levels by 1992 for the owl Forests in the Pacific Southwest Region and for the Pacific Northwest Region are expected to be 0.6 and 2.6 billion board feet, respectively. Because of the higher stumpage prices in this scenario, log exports are assumed to decline from 2.5 and 2.2 billion board feet for 1995 and 2000 in the base-line projection to 1.9 billion board feet in the two years.

ISC

This scenario reflects estimates made by each Region of the impacts of the Spotted Owl Conservation Strategy. In this scenario, ASQ levels by 1992 for the owl Forests in the Pacific Southwest Region and for the Pacific Northwest Region are expected to be 0.3 and 1.7 billion board feet, respectively. Because of higher stumpage prices, softwood log exports are assumed to decline to 1.5 billion board feet in 1995 and 2000 as compared with 2.5 and 2.2 billion board feet, respectively in the base-line projection.

CHA1 and CHA2

These scenarios refer to different assumptions about future harvest levels in the critical habitat areas proposed by the F&WS. Under the terms of CHA1, it was assumed that no harvest would be allowed in the critical habitat areas. In this scenario, ASQ levels by 1992 for the owl Forests in the Pacific Southwest Region and for the Pacific Northwest Region are expected to be 0.2 and 1.4 billion board feet, respectively. Under the terms of CHA2, it was assumed that harvest in conformance to specified guidelines would be allowed. Volumes for CHA2 were estimated by the Pacific Northwest and Pacific Southwest Regions based on the best information available and include allowances for the 50-11-40 rule. In this scenario, ASQ levels by 1992 for the owl Forests in the Pacific Southwest Region and for the Pacific Northwest Region are expected to be 0.3 and 1.5 billion board feet, respectively.

For both scenarios, log exports are assumed to decline to 1.5 billion board feet in 1995 and 2000 as a result of higher domestic stumpage prices.

Table 2. Washington and Oregon Timber Harvest by Ownership, 1980-1989.

State and year	Private	State	National Forest	Bureau of Land Management	Bureau of Indian Affairs	Other public	Total
	(In million board feet, Scribner scale)						
Washington:							
1980	3,507	745	1,089	0	336	43	5,720
1981	3,265	468	875	1	260	20	4,890
1982	3,740	440	728	1	152	18	5,079
1983	4,025	549	1,240	8	238	28	6,088
1984	3,545	795	1,189	2	205	66	5,802
1985	3,561	1,013	1,128	5	213	43	5,963
1986	3,989	1,064	1,232	4	235	32	6,556
1987	4,367	970	1,423	5	238	35	7,037
1988	4,406	826	1,486	0	271	56	7,045
1989	4,520	842	1,141	1	262	22	6,788
Oregon:							
1980	3,134	186	2,399	797	105	19	6,639
1981	2,702	216	1,981	677	95	24	5,695
1982	3,440	175	1,688	312	126	17	5,758
1983	3,374	257	2,902	789	112	31	7,464
1984	3,078	249	3,164	920	101	38	7,550
1985	3,332	268	3,480	891	121	34	8,127
1986	3,494	225	3,850	1,042	104	28	8,743
1987	3,281	199	3,451	1,115	117	52	8,215
1988	3,259	270	3,487	1,439	121	39	8,615
1989	3,485	199	3,307	1,026	124	44	8,186

Scenarios and Combinations: The specific scenarios and their combinations are:

1. Plans
2. Plans, ISC
3. Plans, ISC, CHA1
4. Plans, ISC, CHA2

General Economic Framework and Expected Economic Impacts: Reductions in public harvest, relative to levels in the base scenario, would be expected to raise projected stumpage prices and stimulate some partially compensating response in private harvest. The extent and duration of this private substitution will depend on the price sensitivity of private supply and the availability of inventory above minimum harvest age.

Market equilibrium in these regional markets insures that adjustments will be made for changes in the component parts of regional timber supply functions. Three component parts are considered in regional timber supply functions. Each component part represents different collective behavior on the part of a specific ownership. The two private ownerships (forest industry and other private) are assumed to have different reactions in terms of responding to changes in price and available inventory levels. Harvest levels on public lands are assumed to be set by policy action rather than market forces or inventory conditions.

Economic Impacts: A general summary of projections for selected variables is given in the following tabulation. In the tabulation, regional abbreviations are: PNW-E-eastern Washington and Oregon, PNW-W-western Washington and Oregon, and PSW-California.

U.S. softwood lumber consumption, softwood lumber imports from Canada, softwood plywood consumption, softwood lumber price index, softwood plywood price index, softwood timber harvest, and regional softwood stumpage prices, for the base analysis and four scenarios, 1988, 1991, 1995, and 2000

U.S. softwood lumber consumption by base and scenario (MMBF)

	BASE	+PLANS	+ISC	+CHA1	BASE+PLANS+ ISC+CHA2
1988	47,922	47,922	47,922	47,922	47,922
1991	45,935	45,784	45,757	45,745	45,745
1995	47,212	46,833	46,473	46,515	46,587
2000	44,938	44,814	44,517	44,429	44,717

U.S. softwood lumber imports from Canada by base and scenario (MMBF)

	BASE	+PLANS	+ISC	+CHA1	BASE+PLANS+ ISC+CHA2
1988	14,885	14,885	14,885	14,885	14,885
1991	14,005	14,265	14,352	14,359	14,326
1995	13,747	13,871	14,109	14,128	14,067
2000	11,180	12,271	12,883	12,893	12,368

U.S. softwood plywood consumption by base and scenario (MMSF, 3/8")

	BASE	+PLANS	+ISC	+CHA1	BASE+PLANS+ ISC+CHA2
1988	19,579	19,579	19,579	19,579	19,579
1991	18,258	18,201	18,176	18,173	18,175
1995	18,071	17,898	17,752	17,773	17,791
2000	17,255	17,084	16,861	16,841	16,883

U.S. softwood lumber price index by base and scenario (1967=100)

	BASE	+PLANS	+ISC	+CHA1	BASE+PLANS+ ISC+CHA2
1988	123.8	123.8	123.8	123.8	123.8
1991	127.1	131.0	132.2	132.2	132.3
1995	155.1	160.5	166.6	165.9	164.7
2000	146.8	147.2	151.3	153.4	148.1

U.S. softwood plywood price index by base and scenario (1967=100)

	BASE	+PLANS	+ISC	+CHA1	BASE+PLANS+ ISC+CHA2
1988	99.3	99.3	99.3	99.3	99.3
1991	89.9	92.8	94.5	94.5	94.4
1995	116.8	121.5	126.8	125.9	125.5
2000	104.1	107.6	111.6	113.2	148.1

U.S. softwood timber harvest by base and scenario (MMCF)

	BASE	+PLANS	+ISC	+CHA1	BASE+PLANS+ ISC+CHA2
1988	7,453	7,453	7,453	7,453	7,453
1991	7,194	7,103	7,072	7,070	7,075
1995	7,292	7,107	6,949	6,955	6,973
2000	7,135	6,891	6,676	6,737	6,706

Base softwood stumpage prices by region (1967$/MBF)

	PNW-E	PNW-W	PSW
1988	27.27	42.51	30.07
1991	38.53	44.35	33.29
1995	38.78	48.44	60.67
2000	51.26	41.35	49.24

Base + plans softwood stumpage prices by region (1967$/MBF)

	PNW-E	PNW-W	PSW
1988	27.27	42.51	30.07
1991	51.03	54.55	47.42
1995	62.86	56.22	80.15
2000	46.96	50.08	74.34

Base + plans + ISC softwood stumpage prices by region (1967$/MBF)

	PNW-E	PNW-W	PSW
1988	27.27	42.51	30.07
1991	52.77	60.79	50.52
1995	69.93	76.28	88.44
2000	52.50	70.83	79.09

Base + plans + ISC + CHA1 softwood stumpage prices by region (1967$/MBF)

	PNW-E	PNW-W	PSW
1988	27.27	42.51	30.07
1991	45.10	61.70	50.48
1995	55.82	78.45	86.02
2000	57.95	73.13	79.83

Base + plans + ISC + CHA2 softwood stumpage prices by region (1967$/MBF)

	PNW-E	PNW-W	PSW
1988	27.27	42.51	30.07
1991	45.28	61.05	50.45
1995	56.27	75.92	84.27
2000	55.87	69.33	76.09

The various scenarios were constructed by assuming that reductions in Forest Service harvest flows start in 1991 and that policy changes take effect in 1991. For most variables, there are only small impacts in 1991 because of remaining Forest Service timber under contract and the speed of most economic adjustment processes. It takes several years for the declines in National Forest harvest flows to reach their full economic impacts. Immediate reactions to implementation of the ISC report and designation of critical habitat are difficult to estimate because of the uncertainty as to how the implementation may be carried out.

Plans Scenario

In the plans scenario, compared with the base projection, harvest levels from affected National Forests in the three West Coast States decline 17 percent.

These harvest declines lead to increases in stumpage prices. Higher stumpage prices reduce the competitiveness of producers in the Pacific Northwest and Pacific Southwest regions relative to producers in other regions, thereby forcing downward adjustments in regional lumber and plywood production. Falling lumber and plywood production eventually lead to lower stumpage prices. The assumed decline in log exports helps maintain lumber and plywood production, but in the face of rising wood costs, the region's competitive position deteriorates, profits fall, and solidwood output and capacity decline.

Harvest reductions in the Pacific Southwest and Pacific Northwest Regions have only modest impacts on other domestic regions and final product markets. While there is some response to higher product prices, the bulk of the long-term adjustment is borne within the two regions and by lower domestic consumption and expanded lumber imports.

Plans Plus ISC Scenario

This scenario includes the reductions in ASQ in the Plans scenario plus additional reductions resulting from implementation of the ISC recommendations. These harvest declines lead to rapid increases in stumpage prices. Higher stumpage prices reduce the competitiveness of producers in the Pacific Northwest and Pacific Southwest regions relative to producers in other regions, thereby forcing downward adjustments in regional lumber and plywood production. Rapidly falling lumber and plywood production eventually lead to lower stumpage prices. In the face of rising wood costs, the region's competitive position deteriorates, profits fall, and solidwood output and capacity drop.

Harvest reductions in the Pacific Southwest and Pacific Northwest Regions have only modest impacts on other domestic regions and final product markets. While there is some response to higher product prices, the bulk of the long-term adjustment is borne within the two regions and by lower domestic consumption and expanded lumber imports. Reduced U.S. lumber production leads to increased imports from Canada (1.7 billion board feet), slight increases in production of other U.S. regions, and a drop in U.S. consumption of 0.4 billion board feet. By 2000, lumber prices are 3 percent higher while consumption is 1 percent lower.

Plans Plus ISC Plus CHA1 Scenario

This scenario assumes that no harvest is allowed in the critical habitat areas proposed by the F&WS. This leads to further harvest reductions beyond the reductions after accounting for implementation of forest plans and the ISC strategy.

As shown in Table 1, elimination of harvest in the critical habitat areas reduces sales volume by an additional 22 percent as compared with the ISC strategy.

The additional reductions in volume accentuate the market impacts associated with implementation of the ISC Strategy:

- Stumpage prices increase 3% more than under the ISC Strategy in the Pacific Northwest-West region
- The remaining merchantable sawtimber inventory on private lands is harvested sooner
- Lumber and plywood production decline further on the West Coast
- Imports of softwood lumber from Canada increase somewhat and
- Forest products markets in other U.S. regions are little affected.

Plans Plus ISC Plus CHA2 Scenario

This scenario assumes that timber harvest would be allowed in the critical habitat areas proposed by the F&WS. The volumes estimated to be available are the best estimates of Regions 5 and 6 given the information available as of mid-May, 1991. As additional information becomes available, these estimates may change.

As shown in Table 1, timber offered for sale would be about 8% higher as compared with no harvest in the proposed critical habitat in National Forest boundaries. The percentage increase is somewhat higher for northern California (15%) than for Oregon (7%) and Washington (6%). In general, the additional harvest marginally offsets the market impacts associated with designation of the proposed critical habitat with no harvest:

- Stumpage prices in western Washington and Western Oregon are 5% lower
- Lumber and plywood production are a little higher on the West Coast
- Imports of softwood lumber from Canada decline somewhat, and
- Forest products markets in other U.S. regions are little affected.

REGIONAL AND LOCAL TIMBER-RELATED EFFECTS

Background: This section of the report presents:

- Estimated effects on employment caused by changes in timber harvest levels on National Forests assuming designation of the proposed critical habitat.

- Estimated changes in Federal revenue from National Forests assuming designation of the proposed critical habitat.

- Estimated changes in payments to States from Federal revenues generated on National Forests assuming designation of the proposed critical habitat.

Employment is affected by technology and other factors that change over time. The employment multipliers used in this study represent past gains in efficiency; however, no attempt was made to project this into the future. The emphasis is on change in employment from reduced timber availability; potential future gains in efficiency would apply to any level of timber supply. This information was developed using historical relationships. The IMPLAN input-output economic modeling system was the primary tool used in the analysis.

The information presented here includes the employment effects of processing the timber harvest through the economy. These effects can be estimated in three components:

- The direct effect on the sector(s) either exporting processed wood products from the economic area or selling these products to final consumers within the area,

- The indirect effect on the other production, trade and service sectors within the economy that provide the successive rounds of production inputs needed to manufacture the processed wood products sold to export or final consumption, and

- The induced effect of the consumer spending within the economic area associated with the jobs supporting the direct and indirect production.

The models were used to develop the relationship between the processing of the timber harvest and the total employment supported by it. These relationships provide a way to examine the employment implications of the expected harvest. Two factors could alter these estimates. First, the mix of future processing (lumber, plywood, pulp, log exports, etc.) is not known. In addition, the multipliers are based upon past production technology which will continue to change in the future, changing the relationship between timber harvest and the number of jobs supported. Improvements in processing efficiency have continually reduced the labor requirements per million board feet of timber and these improvements are expected to continue into the future.

Economic Areas: Economic areas made up of groups of counties were identified for each forest with spotted owls. An IMPLAN model was constructed for each Forest. The rule used to delineate these areas in Washington and Oregon was

that approximately 80 percent of the Forests' timber harvest historically has received primary processing within the area. Primary processing is defined as plywood and veneer, lumber, particle board, and other similar manufacturing. In California, a similar rule based on log flows to mills and the relative importance to local mills was used. These areas provide a general picture of where the effects of changes in ASQ by National Forest would occur.

In Washington and Oregon, the Forests and economic areas are:

- Mt. Baker-Snoqualmie - Whatcom, Skagit, Snohomish, King, and Pierce Counties, Washington.
- Olympic - Clallam, Jefferson, Grays Harbor, and Mason Counties, Washington
- Gifford Pinchot - Lewis, Cowlitz, Clark, Skamania, and Klicitat Counties, Washington.
- Okanogan - Okanogan County, Washington.
- Wenatchee - Chelan, Kittitas, Yakima, and Douglas Counties, Washington
- Mt. Hood - Multnomah, Clackamas, Hood River, and Wasco Counties, Oregon.
- Siuslaw - Tillamook, Polk, Lincoln, Benton, and Lane Counties, Oregon.
- Willamette - Marion, Linn, and Lane Counties, Oregon.
- Umpqua - Douglas County, Oregon.
- Siskiyou- Coos, Curry, Josephine, and Jackson Counties, Oregon.
- Rogue River - Jackson, and Josephine Counties, Oregon.
- Winema - Klamath County, Oregon.
- Deschutes - Deschutes County, Oregon.

In California, economic effects are centered in the north coast and north central areas of the State. The north coast area affected includes Del Norte, Humboldt, and Mendocino counties. The north central area most affected includes Glenn, Tehama, Shasta, Trinity, and Siskiyou counties. The Six Rivers National Forest primarily affects the north coast area. The Mendocino National Forest affects both the north coast and north central areas. The Klamath and Shasta-Trinity National Forests primarily affect the north central area. A major portion of the timber from the Klamath National Forest is milled in southern Oregon counties.

Employment Effects: Table 3 displays projected employment effects by affected National Forest from:

- Implementing the actual or projected final plans
- Implementing the ISC Recomendations
- Designating the proposed critical habitat with harvest allowed
- Designating the proposed critical habitat with no harvest allowed.

Table 3. Timber-based Employment Under two Assumptions about Timber Availability in Critical Habitat Areas.

National Forests Affected by the Critical Habitat Determination	Base Volume [1/]	Actual or Projected Final Plans	Actual or Projected Final Plans Plus ISC Strategy	Actual or Projected Final Plans and ISC Strategy plus Implementation of the Proposed Critical Habitat Determination: Estimated Sale Capability both Within and Outside Critical Habitat	Actual or Projected Final Plans and ISC Strategy plus Implementation of the Proposed Critical Habitat Determination: Total Exclusion of Harvest from Critical Habitat
	Number of Jobs				
Washington National Forests					
Gifford Pinchot	4,687	4,035	2,008	1,537	1,428
Mt. Baker-Snoqualmie	1,943	1,234	365	308	308
Okanogan	592	592	489	451	451
Olympic	1,843	1,100	446	376	307
Wenatchee	1,452	1,452	781	760	749
Subtotal	10,518	8,414	4,089	3,432	3,243
Oregon National Forests					
Deschutes	1,380	683	530	510	496
Mt. Hood	2,924	2,060	1,351	1,090	992
Rogue River	1,345	1,178	735	559	559
Siskiyou	1,872	1,872	1,229	1,005	959
Siuslaw	4,087	4,087	2,074	1,952	1,928
Umpqua	3.492	3,430	2,472	1,813	1,710
Willamette	6,157	5,322	2,927	2,182	1,782
Winema	1,485	858	728	698	690
Subtotal	22,742	19,490	12,046	9,809	9,116
California National Forests					
Klamath	1,980	1,420	960	920	810
Mendocino	809	731	235	226	218
Shasta-Trinity	2,621	2,621	959	913	819
Six Rivers	2,100	1,800	924	780	600
Subtotal	7,510	6,572	3,078	2,839	2,447
Total Forest Service	40,770	34,476	19,213	16,080	14,806

1/ Base volume for calculating these employment figures is the Allowable Sale Quantity (ASQ) in Forest Plans as of May, 1990; includes final Forest Plans or draft Forest Plans where plans had not been finalized.

Implementation of the actual or projected final plans for the Forest Service would result in a decline in employment of 6,294 people. Implementation of the ISC recommendations would result in a further decline of 15,263 people for a total decline in employment of 21,557 people for the three West Coast States as compared with estimated employment at the level associated with base volumes. Designation of proposed critical habitat with no harvest allowed would result in a further decline of 4,407 people as compared with implementation of the ISC Strategy. Designation of proposed critical habitat with harvest allowed in the habitat would result in a further decline of 3,133 people as compared with implementation of the ISC Strategy. In total, implementation of final plans, implementation of the ISC recommendations and designation of proposed critical habitat would result in a loss of 24,690-25,964 jobs, depending on harvest in the proposed designated critical habitat. It is important to keep in mind that these employment estimates are for both direct, indirect, and induced employment associated with timber harvest on just those National Forests affected by the ISC Recommendations. It does not include private and other public ownerships, nor does it include Forest Service lands not affected by the proposed designated critical habitat.

For comparison, in 1988 about 250,000 people were employed in the forest products industries in Washington, Oregon, and California. Employment figures shown in this report include direct industry employment, jobs that support this direct employment, and induced employment. Estimates range from 40-60 percent of total employment that could be classified as forest industry employment. Therefore, roughly, half of the employment figures shown here, about 12-13,000 jobs, are forest industry, For perspective, this would account for about 4-5 percent of total industry employment in the three States. However, since employment impacts are concentrated in certain areas,the percentage would be much greater in these localities.

On a State-by-State basis, the largest loss of jobs from Forest Service harvest reductions will be in the State of Oregon; 12,933-13,626 fewer jobs will be available. In Washington, employment will decline by 7,086-7,275 jobs; and in California, job loss will total 4,671-5,063.

An additional increment of reduced employment is expected to occur in the Federal sector. Forest Service employment could decline by 2,000-3,000 positions in the three States. Reduction in Federal employment is a significant consideration. Many of these people live and work in the same rural communities where forest industries are a dominant part of the economy. Their loss will place an added burden on communities.

Timber-based Revenues: Timber harvest throughout the area is an important source of Federal revenue. Table 4 shows estimates of timber-based revenue to the U.S. Treasury. These estimates were made using recent prices and projected changes in stumpage prices from the TAMM analysis discussed previously. The possible reductions in Forest Service harvest caused by implementation of the ISC Recommendations and designation of proposed critical habitat are large and, as a result, significant increases in stumpage prices are expected. The analysis shows that implementation of forest plans and the ISC recommendation by the Forest Service would reduce timber-based revenue by about $373 million in the three West Coast States in 1995, and $330 million in 2000 as compared with the base projection. Compared with the base projection, designation of proposed critical habitat with harvest allowed would reduce timber-based

Table 4. Timber-based Revenue Under two Assumptions About Timber Availability in Critical Habitat Areas.

National Forests Affected by the Critical Habitat Determination	Base Volume 1/		Actual or Projected Final Plans		Actual or Projected Final Plans Plus ISC Strategy		Actual or Projected Final Plans and ISC Strategy plus Implementation of the Proposed Critical Habitat Determination: Estimated Sale Capability both Within and Outside Critical Habitat		Actual or Projected Final Plans and ISC Strategy plus Implementation of the Proposed Critical Habitat Determination: Total Exclusion of Harvest from Critical Habitat	
	1995	2000	1995	2000	1995	2000	1995	2000	1995	2000
	Millions of 1990 Dollars									
Washington National Forests										
Gifford Pinchot	88	75	83	74	50	46	38	34	36	34
Mt. Baker-Snoqualmie	45	39	32	28	11	11	10	9	10	9
Okanogan	9	12	12	9	11	8	9	9	9	9
Olympic	43	37	28	25	14	13	12	11	9	9
Wenatchee	19	25	25	19	14	11	12	12	12	13
Subtotal	204	188	180	155	100	89	81	75	76	74
Oregon National Forests										
Deschutes	35	46	23	17	19	14	16	16	16	16
Mt. Hood	72	62	59	52	47	43	38	34	35	33
Rogue River	33	28	31	28	24	22	18	16	18	17
Siskiyou	53	45	58	52	46	43	38	34	37	34
Siuslaw	113	97	124	111	76	71	71	65	72	67
Umpqua	95	81	103	92	89	83	65	60	63	59
Willamette	172	147	164	146	108	101	81	74	68	63
Winema	44	58	34	25	30	23	26	26	25	26
Subtotal	617	564	596	523	439	400	353	325	334	316
California National Forests										
Klamath	29	24	24	22	17	15	16	15	14	13
Mendocino	24	19	25	23	8	8	8	7	8	7
Shasta-Trinity	68	55	78	73	30	27	28	25	25	23
Six Rivers	55	45	55	51	30	26	24	22	19	18
Subtotal	176	143	182	169	85	76	76	69	66	61
Total Forest Service	997	895	958	847	624	565	510	469	476	451

1/ Base volume for calculating revenues is the Allowable Sale Quantity (ASQ) in Forest Plans as of May, 1990; includes final Forest Plans or draft Forest Plans where plans had not been finalized.

revenue by $487 million in the three States in 1995 and $426 million in 2000. If harvest is not allowed, the reductions would be somewhat more--$521 million in 1995 and $444 million in 2000.

Payments to States: Revenue sharing, commonly refered to as "payments to States" is estimated using projected changes in harvest, and forest-specific long-term stumpage prices (Table 5). Total revenue is estimated for each forest. It is important to remember that, for the purposes of this report, the only payments to States that are considered are those associated with National Forests affected by the ISC Recommendations and designation of proposed critical habitat.

The following tabulation shows changes in payments to States for 1995 and 2000 for the reduction in timber harvest from base volume levels to the level in the ISC Conservation Strategy and for designation of proposed critical habitat with and without harvest permitted in the designated habitat.

	Washington	Oregon	California	Total
	(million dollars)			
		1995		
Actual or projected final plans plus ISC Strategy	-23.6	-44.3	-22.9	-90.8
Actual or projected final plans and ISC Strategy plus implementation of the Proposed Critical Habitat Determination				
With harvest	-28.0	-64.5	-25.1	-117.6
No harvest	-28.9	-69.1	-27.6	-125.6
		2000		
Actual or projected final plans plus ISC Strategy	-22.3	-44.2	-17.0	-83.5
Actual or projected final plans and ISC Strategy plus implementation of the Proposed Critical Habitat Determination				
With harvest	-25.4	-61.0	-18.8	-105.2
No harvest	-25.8	-63.2	-20.6	-109.6

In total, payments to the three States would be about $117-126 million lower in 1995 and $105-110 million lower in 2000 as a result of implementation of actual or projected final plans, the ISC Strategy, and proposed critical habitat designation.

Table 5. Payments to States Under two Assumptions About Timber Availability in Critical Habitat Areas.

National Forests Affected by the Critical Habitat Determination	Base Volume 1/		Actual or Projected Final Plans		Actual or Projected Final Plans Plus ISC Strategy		Actual or Projected Final Plans and ISC Strategy plus Implementation of the Proposed Critical Habitat Determination: Estimated Sale Capability both Within and Outside Critical Habitat		Actual or Projected Final Plans and ISC Strategy plus Implementation of the Proposed Critical Habitat Determination: Total Exclusion of Harvest from Critical Habitat	
	1995	2000	1995	2000	1995	2000	1995	2000	1995	2000
	Thousands of 1990 Dollars									
Washington National Forests										
Gifford Pinchot	20,375	17,412	19,293	17,221	11,570	10,778	8,852	8,064	8,394	7,830
Mt. Baker-Snoqualmie	10,264	8,771	7,173	6,402	2,564	2,389	2,164	1,971	2,208	2,060
Okanogan	2,000	2,646	2,646	1,969	2,301	1,729	1,896	1,884	1,896	1,968
Olympic	9,382	8,017	6,159	5,497	3,013	2,806	2,544	2,318	2,118	1,976
Wenatchee	4,172	5,519	5,519	4,106	3,121	2,345	2,709	2,692	2,671	2,773
Subtotal	46,193	42,365	40,790	35,195	22,569	20,047	18,165	16,929	17,287	16,607
Oregon National Forests										
Deschutes	14,454	19,120	9,465	7,042	7,778	5,845	6,676	6,634	6,498	6,745
Mt. Hood	15,575	13,309	12,698	11,334	10,052	9,364	8,107	7,385	7,529	7,023
Rogue River	7,257	6,202	6,992	6,241	5,273	4,912	4,007	3,651	4,090	3,815
Siskiyou	11,203	9,574	12,324	11,000	9,759	9,090	7,993	7,281	7,777	7,256
Siuslaw	26,908	22,994	29,599	26,419	18,124	16,882	17,058	15,539	17,191	16,037
Umpqua	21,291	18,194	23,007	20,535	19,948	18,582	14,628	13,326	14,081	13,136
Willamette	41,315	35,305	39,286	35,065	26,163	24,371	19,502	17,765	16,257	15,166
Winema	10,609	14,034	8,110	6,034	7,207	5,415	6,168	6,129	6,102	6,333
Subtotal	148,612	138,732	141,481	123,670	104,304	94,461	84,138	77,710	79,525	75,511
California National Forests										
Klamath	7,414	6,036	6,108	5,669	4,312	3,855	4,045	3,651	3,600	3,330
Mendocino	6,332	5,155	6,636	6,159	2,227	1,992	2,099	1,895	2,040	1,888
Shasta-Trinity	16,269	13,244	18,709	17,365	7,152	6,395	6,659	6,011	6,040	5,588
Six Rivers	14,058	11,445	13,981	12,977	7,494	6,701	6,192	5,590	4,815	4,454
Subtotal	44,073	35,880	45,434	42,170	21,185	18,943	18,995	17,147	16,495	15,260
Total Forest Service	238,878	216,977	227,705	201,035	148,058	133,451	121,299	111,786	113,307	107,378

1/ Base volume for calculating payments to States is the Allowable Sale Quantity (ASQ) in Forest Plans as of May, 1990; includes final Forest Plans or draft Forest Plans where plans had not been finalized.

Summary of Economic Impacts: This analysis of economic impacts has identified the size and geographic distribution of the following effects:

- Employment associated with affected National Forest timber sales
- Federal revenues from affected National Forest timber sales
- Federal payments to States from affected National Forest timber sales

If designation of the proposed critical habitat leads to reduced harvest on other public lands and reduced private harvest as suggested by the industry survey shown in this analysis, effects could be significantly larger.

Compared with the base projection, general orders of magnitude for effects from designation of the proposed critical habitat on National Forests are:

- A decline in anticipated allowable sale quantity of 2.3-2.4 billion board feet on National Forests.

- 24,690-25,964 jobs supported by National Forest timber would be lost in the three States.

- A $400-500 million decline in Federal revenue from timber sales, with the exact value dependent on future stumpage prices and the extent of harvest in the proposed designated critical habitat on National Forests.

- A $100-125 million decline in payments to States from Federal timber sale revenue with the exact value dependent on future stumpage prices and the extent of harvest in the proposed designated critical habitat on National Forests.

NONTIMBER EFFECTS

Negative economic and other impacts resulting from the proposed designation of critical habitat on nontimber activities and projects is difficult to quantify. If no activities and projects are allowed and a "hands off" management style followed,there could be negative impacts on watersheds, fisheries, and wildlife populations. Just on the Salmon River R.D. located on the Klamath National Forest in California, approximately 3-4,000 juvenile fish are estimated to be affected if fish improvement projects were not allowed. However it is assumed for this analysis that activities will be allowed such as instream rehabilitation, trail maintenance and reconstruction, road maintenance and reconstruction, campground use, maintenance and reconstruction, hazard tree felling, and removal of gravel and rock from existing sources.

Nonetheless there are a number of current or future activities that are adversely affected in the Critical Habitat Areas. One such activity is fuel treatments. Underburning projects have a highly positive effect by reducing fuel loadings and the chance of catastrophic fire. Based on a survey of affected forests, the total fuels treatment necessitated by current sales under contract in critical habitat areas is estimated to be over 67,000 acres. By not reducing the fire hazard associated with this activity, fuels will result in a greater risk of catastrophic fire events detrimental to critical habitat. The annual number of acres of critical habitat lost to wildfire also will increase. In addition, the cost of fire suppression in the Critical Habitat Areas will rise by approximately $1,000,000 annually until the fire hazard created by fuels is reduced by natural processes.

Further, unless boundaries are adjusted or activities are permitted in Critical Habitat Areas, development or expansion of winter sports areas and campgrounds will be affected as well as operations of mines (Table 6). This could affect over one million visits to ski areas. Restriction on development of campgrounds and trailheads could affect 28 thousand Recreation Visitor Days (RVDs). Payrolls totaling $2,500,000 from mining operations would be influenced. The major item on the table is for construction of a needed access road through a Critical Habitat Area to the proposed Mt. Shasta Ski Area which affects 900 nontimber jobs. Overall 2.5 thousand nontimber jobs could be impacted by the end of the decade.

Table 6. Areas or Projects that will be Affected from Critical Habitat Area Designation.

PROJECT/AREA	LOCATION	ACRES	IMPACT	JOBS
Oregon National Forests:				
Expansion of Mt.Hood Meadows Ski Area	Mt. Hood NF	1800	250,000 visits/yr	480 jobs
Winter Sport Gov't Camp & Timberline Ski Area	Mt. Hood NF	800	75,000 visits/yr	160 jobs
Pelican Butte Ski Area	Winema NF	5100	80,000-150,000 visits/yr	180 jobs
Lake of the Woods/ Tri-lakes Ski Area	Winema & Rogue River NF's	2000	63,000 RVDs/yr	150 jobs
Bornite Mine	Willamette NF	30	$2.5mm payroll/yr	80-180 jobs
Washington National Forests:				
White Pass Ski Area	Wenatchee NF	165	7,500 visits/yr	25 jobs
Expansion of Early Winters Resort	Okanogan NF	1500	8,200 visits/yr	30 jobs
Expansion of Crystal Mt. Ski Area	Mt. Baker-Snoqualmie NF	400	70,000 visits/yr	160 jobs
Expansion of Hyak Ski Area	Mt. Baker-Snoqualmie NF	350	80,000 visits/yr	160 jobs
Expansion of Ski Acres	Mt. Baker-Snoqualmie NF	100	40,000 visits/yr	80 jobs
California National Forests:				
Mt. Shasta Ski Area Access Road	Shasta-Trinity NF	NA	236,000 to 277,000 RVDs/yr	900 jobs
Development of McBride Springs CG.	Shasta-Trinity NF	20	11,250 RVDs per year	5 jobs
Hardway Gold Mine	Shasta-Trinity NF	NA	Not available	2 jobs
Development of Ukonom R.D. Traihead	Klamath NF	5	8,100 RVDs per year	3 jobs
Development of Goosenest R.D. CG.	Klamath NF	5	9,250 RVDs per year	3 jobs

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APPENDIX

Comparison with the May 1, 1990, Report, "Economic Effects of Implementing A Conservation Strategy for the Northern Spotted Owl"

As part of the effort to gather thorough and timely information on the habitat needs of the Northern Spotted Owl, an Interagency Scientific Committee (ISC) was established in August 1988 to address the conservation of the owl. The Committee released a report entitled "A Conservation Strategy for the Northern Spotted Owl" on April 3, 1990. The proposed conservation strategy in that report was analyzed by the Forest Service and Bureau of Land Management to determine the economic affects if the strategy were fully implemented.

The Forest Service/Bureau of Land Management economic analysis was released on May 1, 1990, in a report "Economic Effects of Implementing a Conservation Strategy for the Northern Spotted Owl." This Appendix documents revisions to the 1990 report and compares the 1990 analysis with the analysis just completed. This should help to understand changes in impacts due to these revisions as compared with new impacts due to the proposed critical habitat designation.

A major difference in this analysis as compared with the 1990 report is the inclusion of only National Forest estimates of changes in available timber volume and related economic effects. The May 1, 1990, analysis also included effects related to Bureau of Land Management lands and private lands although, like this report, it did not include any other public ownerships.

A second broad change is the updating of price information and re-analysis of the national and regional timber market situation.

Third, the new export restriction has been included in this analysis. The effect is to lower export demands on timber supplies which means additional timber is available for the domestic market.

Finally, the allowable sale quantities on affected National Forests were updated to account for changes when finalizing Forest plans and to include revised estimates of ISC Strategy effects. Also, allowable sale quantity is shown in this analysis for two assumptions about implementation of the proposed critical habitat designation:

1. Estimated sale capability both within and outside critical habitat, and

2. Total exclusion of harvest from critical habitat.

Table A-1 shows a comparison of the current report with the May 1, 1990 report for:

-- Allowable sale quantity on National Forests.

-- Timber-based employment.

-- Timber-based returns to the U.S. Treasury.

-- Timber-based payments to States.

As the table shows, no changes were made in the base volume between the reports. For actual or projected final plans, the only change was for the Forest Plan on the Mt. Hood National Forest. Adjustments were made in allowable sale quantity for all forests as a result of further analysis of the requirements of the ISC Strategy.

After volume adjustments in response to the ISC Strategy, this report shows an additional decline of 3,832 in number of jobs; a total decline of 21,557 as compared with 17,679 shown for National Forest timber volume reductions in the May 1, 1990, report. Table A-2 shows changes in timber volume and employment for the two reports.

Table A-1. A Comparison of the May 1, 1990, Analysis of Economic Effects with the Analysis in this Report, for National Forests Only.[1/]

National Forests Affected by the Critical Habitat Determination	Base Volume[2/]		Actual or Projected Final Plans		Actual or Projected Final Plans Plus ISC Strategy		Actual or Projected Final Plans and ISC Strategy plus Implementation of the Proposed Critical Habitat Determination: Estimated Sale Capability both Within and Outside Critical Habitat	Actual or Projected Final Plans and ISC Strategy plus Implementation of the Proposed Critical Habitat Determination: Total Exclusion of Harvest from Critical Habitat
	5/1/90	6/5/91	5/1/90	6/5/91	5/1/90	6/5/91	6/5/91	6/5/91
Washington National Forests								
ASQ (million board feet)	943	943	752	752	419	368	311	294
Timber-based Employment	10,518	10,518	8,414	8,414	4,665	4,089	3,432	3,243
Timber-based Revenue(mill $)	151	188	156	155	97	89	75	74
Payments to States (mill $)	36	42	37	35	23	20	17	17
Oregon National Forests								
ASQ (million board feet)	2,196	2,196	1,848	1,844	1,362	1,160	949	884
Timber-based Employment	22,742	22,742	19,536	19,490	14,173	12,046	9,809	9,116
Timber-based Revenue(mill $)	468	564	532	523	453	400	325	316
Payments to States (mill $)	99	139	113	124	95	94	78	75
California National Forests								
ASQ (million board feet)	694	694	600	600	392	282	261	226
Timber-based Employment	7,510	7,510	6,572	6,572	4,253	3,078	2,839	2,447
Timber-based Revenue(mill $)	99	143	103	169	68	76	69	61
Payments to States (mill $)	22	36	23	42	15	19	17	15
Total Forest Service								
ASQ (million board feet)	3,842	3,842	3,200	3,196	2,713	1,810	1,521	1,404
Timber-based Employment	40,770	40,770	34,522	34,476	23,091	19,213	16,080	14,806
Timber-based Revenue(mill $)	718	895	791	847	618	565	469	451
Payments to States (mill $)	157	217	173	201	133	133	112	107

1/ Data are for the Year 2000.

2/ Allowable Sale Quantity (ASQ) in Forest Plans as of May, 1990; includes final Forest Plans or draft Forest Plans where plans had not been finalized.

Table A-2. Incremental Changes in Timber Volume and Employment in Northern Spotted Owl-affected Areas of Washington, Oregon, and California--National Forests Only, 2000.

National Forest Change from Base Volume to:	May 1, 1990 Analysis of ISC Strategy		June 5, 1991 Analysis of Proposed Critical Habitat	
	Timber Volume MMBF	Employment Jobs	Timber Volume MMBF	Employment Jobs
Final Plans	-633	-6,248	-637 [1/]	-6,294
ISC Strategy	-1,027	-11,431	-1,027	--
R-5 Change (CA) [2/]	N/A	N/A	-110	--
R-6 Change (WA/OR) [3/]	N/A	N/A	-249	--
6/5/91 Total	N/A	N/A	-1,386	-15,263
Critical Habitat				
- Some Harvest Capability	N/A	N/A	-289	-3,133
- Total Exclusion of Harvest	N/A	N/A	-406	-4,407
Total National Forest	-1,660 [4/]	-17,679 [5/]	--	--
- Some Harvest Capability	N/A	N/A	-2,312	-24,690
- Total Exclusion of Harvest	N/A	N/A	-2,429	-25,964

1/ Changes between the two analyses reflect a 4 million board foot reduction in the Mt. Hood National Forest Plan.

2/ Changes between the two analyses in R-5 reflect allowances for the 50-11-40 rule which was not included in the 5/1/90 analysis.

3/ Changes between the two analyses in R-6 reflect updated HCA acreages (39 million board feet) and additional allowances for the 50-11-40 rule (210 million board feet).

4/ Addition of BLM and private lands in the May 1, 1990 report made this number -2,668.

5/ Addition of BLM and private lands in the May 1, 1990 report made this number -28,165.

N/A--Not Applicable.